

Submission Title:

Assimilation of Reconstructed Radiances from IASI Principal Component Scores into the GEOS-ADAS

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Abstract

Hyperspectral Infrared sounders such as IASI, AIRS, and CrIS have long been an integral part of radiance assimilation in numerical weather prediction (NWP), providing vertical profiles of water vapor and temperature information. Principal Component Scores (PCS) are a lossy form of compression that retains most information, such as temperature and moisture, by using a large training set of atmospheric profiles. However, PCS may not well represent profiles which are rare events, such as volcanic eruptions, and drops some sources of random noise. There has been an increased interest in the use of PCS as EUMETSAT plans to distribute future geostationary sounder radiances from MTG-IRS via PCS only. NWP centers use two approaches to deal with PCS: direct assimilation of the PCS by modifying the radiative transfer model to produce PCS and the associated Jacobians, or a simpler approach of decompressing the PCS and reconstructing the radiances back into channel space to allow assimilating radiances without modifications to the data assimilation system. EUMETSAT has developed a PCS product for IASI that has been operational since 2011. We utilize this product opting for the simpler approach, decompressing IASI PCS into channel space, and assimilating those radiances using the GEOS-ADAS. We then compare this with a control using the standard IASI radiance product. Resulting differences in global forecast statistics, differences in Forecast Sensitivity to Observation Impact, along with implications for implementation and quality control are discussed.